

**WHAT IS CLAIMED IS:**

1. A method for determining the relative timing of a pilot signal transmitted by a base station with respect to a timing reference signal, comprising:
  - a) generating a reference CDMA pilot signal on the same carrier frequency on which the pilot signal is generated by the base station, the reference CDMA pilot signal having a known timing relationship to the timing reference signal;
  - b) locking the frequency of the reference CDMA pilot signal and the timing reference signal to a common frequency reference;
  - c) combining the reference CDMA pilot signal the pilot signal generated by the base station; and
  - d) determining the time offset between the reference CDMA pilot signal and the pilot signal generated by the base station.
2. The method of Claim 1, wherein the timing difference between the reference CDMA pilot signal and the pilot signal generated by the base station is determined using a mobile device having a pilot searcher.
3. The method of Claim 1, wherein the reference CDMA pilot signal is generated by a base station simulator.
4. The method of Claim 1, wherein the timing reference signal is a signal indicating the GPS time clock 1 PPS tick.
5. The method of Claim 1, wherein the common frequency reference is a 10 MHz output from a GPS receiver.
6. The method of Claim 5, wherein the timing reference signal is generated by the GPS receiver.
7. The method of Claim 1, wherein the combining of the reference CDMA pilot signal and the pilot signal generated by the base station is an RF combining.

8. A method for determining the relative timing of a pilot signal with respect to a timing reference signal, the pilot signal being generated by a base station and transmitted through a transmission antenna, the method comprising:
- a) receiving the pilot signal generated by the base station in a pilot signal receiver having an antenna, the transmission delay between the antenna of the receiver and the transmission antenna of the base station being known;
  - b) storing the received pilot signal;
  - c) calibrating the delay from the antenna of the receiver to the digitizing converter;
  - d) triggering the reception and storage of the pilot signal with a signal based upon a known timing relationship with the timing reference signal; and
  - e) processing the stored data to determine the relationship between the received signal and the timing reference signal.
9. The method of Claim 8, wherein the received pilot signal is digitized prior to being stored.
10. The method of Claim 8, wherein the timing reference signal is a signal indicating the GPS time clock 1 PPS tick.
11. The method of Claim 10, wherein the reception and storage of the received signal is triggered at a known time with respect to the GPS time clock 1 PPS tick.
12. The method of Claim 10, wherein the reception and storage of the received signal is triggered at the GPS time clock 1 PPS tick.
13. A data logger comprising:
- a) a triggered receiver capable of receiving signals from a base station upon receipt of a trigger;
  - b) a storage device capable of storing the received signals; and
  - c) a processor capable of analyzing the stored received signals and determining the relative timing between the stored received signals and a reference signal having a known timing relationship to the trigger.

14. The data logger of Claim 13, wherein the reference signal is the trigger.

15. A data logger comprising:

- 2 a) a receiver capable of receiving signals from a base station;
- b) a triggered storage device capable of storing the received signals upon receipt of
- 4 a trigger; and
- c) a processor capable of analyzing the stored received signals and determining the
- 6 relative timing between the stored received signals and a reference signal having
- a known timing relationship to the trigger.

16. The data logger of Claim 15, wherein the reference signal is the trigger.

17. A method for determining the amount of delay between a base station and a

- 2 transmission antenna of the base station, comprising:
- a) knowing the position of a reception antenna;
- 4 b) knowing the location of the transmission antenna;
- c) using the knowledge of the locations of the reception and transmission antennas
- 6 to determine the air time between the reception and transmission antennas;
- d) determining an transmission time by calculating the time it takes for a signal
- 8 transmitted from the base station through the transmission antenna to arrive at
- the reception antenna; and
- 10 e) determining the amount of delay between the base station and the transmission
- antenna by subtracting the air time from the transmission time.

18. The method of Claim 17, wherein the location of the reception antenna is

- 2 determined by using a GPS position location system.

19. The method of Claim 17, further including:

- 2 a) knowing the relative timing of the base station signals with respect to the
- reference signal, at the point of generation of the base station signals; and
- 4 b) offsetting the relative timing of the base station signals with respect to the
- reference signals, at the point of generation of the base station signals, to

6           determine the timing at the transmission antenna, with respect to the reference  
8           signal, of base station signals generated by the base station.

10       20. An apparatus for determining the relative timing of a pilot signal transmitted by a  
12       base station with respect to a timing reference signal, comprising:

- 14       a) a generator capable of generating a reference CDMA pilot signal on the same  
16       carrier frequency on which the pilot signal is generated by the base station, the  
18       reference CDMA pilot signal having a known timing relationship to the timing  
20       reference signal, the generator also being capable of locking the frequency of the  
      reference CDMA pilot signal and the timing reference signal to a common  
      frequency reference;
- b) a combiner capable of combining the reference CDMA pilot signal the pilot  
      signal generated by the base station; and
- c) a device capable of determining the time offset between the reference CDMA  
      pilot signal and the pilot signal generated by the base station.

21. The apparatus of Claim 20, wherein the device capable of determining the time  
2       offset is a CDMA mobile station.

22. An apparatus for determining the relative timing of a pilot signal with respect to a  
2       timing reference signal, the pilot signal being generated by a base station and  
      transmitted through a transmission antenna, the apparatus comprising:

- 4       a) a receiver capable of receiving the pilot signal generated by the base station, the  
6       receiver having an antenna and a trigger input, the trigger input providing a  
      means by which the receiver can be triggered to receive and store the pilot  
      signal;
- 8       b) a memory coupled to the receiver, the memory being capable of storing the  
      received pilot signal;
- 10       c) signal measurement equipment capable of calibrating an antenna/converter  
      delay; and
- 12       d) a processor coupled to the memory and configured to receive information  
      regarding the antenna/converter delay, the processor being capable of processing

- 14 the stored data and the antenna/converter delay to determine the relationship between the received signal and the timing reference signal.

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